

MIFACE Investigation Report #10MI200

SUBJECT: Farmer's Head and Neck Crushed Between Semi Trailer and Loading/Unloading Chute

Summary

In the Fall of 2010, a male farmer in his 50s died when his head and neck were crushed while directing a backing semi-tractor/trailer to a wooden chute providing loading/unloading access to a pig storage building. The unit was delivering pigs. The trailer transporting the pigs was constructed so the pigs could be unloaded single file into the wooden chute. Due to layout of the farm's driveways, the semi could not back straight into the chute area but had to back in on an angle, which made it more difficult for the trailer to be in alignment with the chute. The animal delivery occurred in the early morning. The decedent, after conversing with the semi driver, walked back to the chute and at some point, climbed onto the chute floor. As the semi was backing to the southeast, it appears the decedent placed his head between the backing trailer and the chute wall, most likely to determine proper alignment of the backing trailer. During the backing of the semi, the driver stated he could see the decedent's hand waving him back. The decedent's head and neck were crushed by the trailer against the loading chute. The decedent was declared dead at the scene.



Figure 1. Overview of incident scene.

Contributory factors:

- Rock pile in backing area
- Design of backing area causing truck to come in on an angle
- Chute design
- Decedent in path of backing vehicle and not in full view of semi driver
- No spotter

RECOMMENDATIONS

- The driver of a backing vehicle and any worker on foot (including a spotter) should be able to view each other in the vehicle's mirrors. If the driver cannot see the worker on foot, the driver should immediately stop the vehicle.

- Farmers should conduct a hazard assessment to identify safety hazards/issues and develop a remediation strategy. In this incident, safety issues such as the rock pile location, design of the pig chute, design of the driveway access, and working alone in the vehicle's blind spot were contributing factors and may have been identified in a hazard assessment.
- As part of the hazard assessment, farmers should determine areas on the farm where agricultural equipment/other vehicles, such as semi-tractor/trailers that transport product to/from the farm, will be backed up and develop a backing vehicle protocol for these areas.
- Trucking employers should determine the feasibility and effectiveness of mounting an after-market backup camera system on the semi trailer to assist the driver to safely back the unit.

INTRODUCTION

In the fall of 2010, a male farmer in his 50s died when his head and neck were crushed while directing a backing semi-tractor/trailer hauling pigs to the load/unload chute of a pig storage building. MIFACE researchers learned of this death through a newspaper article. The MIFACE researchers contacted the family of the deceased and the family agreed to participate in the MIFACE research program. In the spring of 2011, the MIFACE researcher conducted a site visit. One of the family members interviewed escorted the MIFACE researcher to the incident scene and permitted the MIFACE researcher to take photographs. During the course of writing this report, MIFACE reviewed the Medical Examiner and police department reports, the death certificate and newspaper clippings. Pictures used in the report are courtesy of the responding police department (Figures 1 and 4) and photographs (Figures 3, 5, and 6) taken at the time of the MIFACE site visit.

The decedent's family owned the farm and he had been working full-time on the farm for the past 37 years. The farm grew corn, beans and wheat, and conducted contract feeding of pigs. The decedent had been responsible for the contract feeding operation for the past 10 years. Pigs were delivered via semi-tractor/trailer two times per year, fed until they reached the desired weight, and then loaded and transported onto a semi-tractor trailer and transported to the final destination.

The family farm did not have a written farm safety plan.

INVESTIGATION

The decedent began his chores at approximately 6:30 a.m. The incident occurred at approximately 8:00 a.m. at the 35-year-old pig storage building. At a nearby tractor storage building, located to the southwest of the pig storage building, a rock pile extended approximately nine feet from the edge of the building (Figure 4). This condition had been present for more than

30 years according to the family member. Due to the rock pile location, the driveways had been widened by approximately 10 feet and the mailbox moved to accommodate loading and unloading the semi-tractor/trailer. The layout of the farm's driveways, location of the rock pile and the angle of the chute extending from the pig storage building presented a backing issue for the semi driver. It was necessary for the driver to back the semi at an angle, which made it more difficult to align the trailer with the chute (Figures 2, 3 and 4).

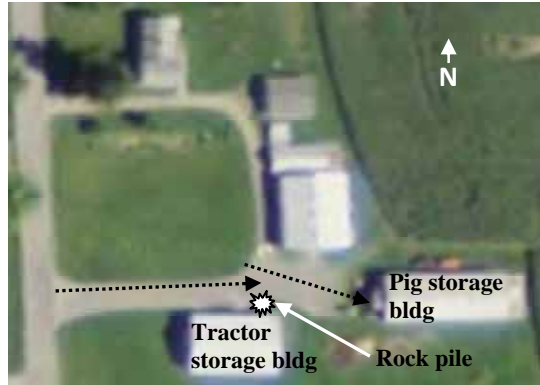


Figure 2. Google Map® satellite view of incident location. Dotted arrows show path of backing semi.

The loading/unloading chute floor was 41 inches from the ground and 27 inches wide. It was constructed to permit pigs to enter the building via a door on the west side of the pig storage building. The chute had been constructed to angle slightly north to accommodate the rock pile in front of the tractor storage building (Figures 3 and 5). At each side of the chute wall below the level of the chute ramp was a 4.5- inch cut-out to allow for a tight alignment of the trailer to the chute (Figure 4).

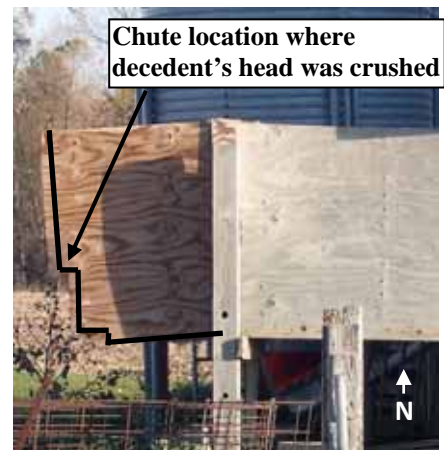


Decedent's approximate location

Figure 3. Chute angle from pig building

According to the decedent's family member, this was the first time the decedent had worked with this driver and the first time the driver had been at the farm.

The decedent was wearing blue coveralls and a red shirt. He was not wearing a reflective vest or reflective gloves as he was directing the



Chute location where decedent's head was crushed

Figure 4. Chute construction

semi driver to the chute. A family member saw the decedent walk to the semi cab and speak to the driver. The semi driver indicated in the police report that the decedent told him to keep backing up, and that the decedent would guide him to the chute. The family member was on the opposite side of the tractor/trailer seeing only the decedent's legs under the trailer as he walked to and from the semi cab. The family member then got into his pickup truck and was preparing to go to the field when the incident occurred.

The event was un-witnessed and the sequence of events is unknown. The semi driver indicated in the police report that the decedent was standing on the chute floor, on the south side of the chute (Figures 3 and 5). The driver indicated he could see only the decedent's hand waving him back to the chute during the backing process.

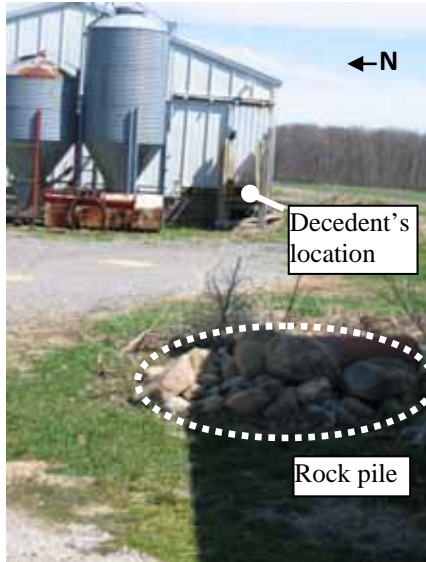


Figure 5. Standing next to tractor storage building, looking east.

The semi-tractor/trailer was backing to the southeast (Figure 6). It was sunny. The sequence of events causing the decedent to place his head between the chute wall and the backing trailer is unknown. When the driver felt the trailer bump the ramp, he set the parking brake, exited the cab, and walked back to the chute. Observing the decedent's head and neck pinned between the chute and the

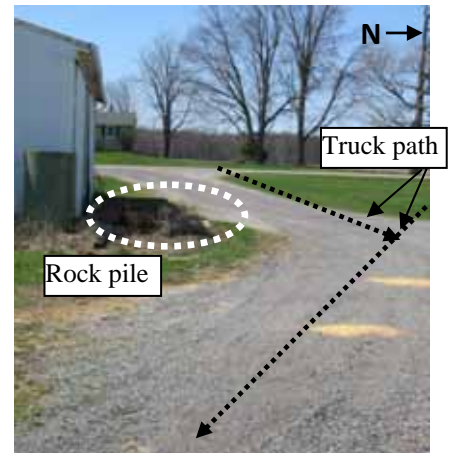


Figure 6. Standing in front of pig storage building chute. Truck path indicated by arrows.

corner of the driver's side of the trailer, he ran back to the

tractor and pulled the unit forward. The driver exited the cab, called for emergency response and then returned to the decedent. The driver indicated that while he was moving the tractor forward and calling for emergency response, the decedent fell from the chute floor to the ground. The police report indicated that the decedent was laying on his right side when emergency responders arrived. He was declared dead at the scene.

CAUSE OF DEATH

The cause of death as listed on the death certificate was head and neck trauma. Toxicology results were negative for alcohol and illegal drugs. Toxicology tests were positive for diphenhydramine (cough/cold/allergy medicine) and salicylates (aspirin).

RECOMMENDATIONS/DISCUSSION

- The driver of a backing vehicle and any worker on foot (including a spotter) should be able to view each other in the vehicle's mirrors. If the driver cannot see the worker on foot, the driver should immediately stop the vehicle.

Although the technical aspects of operating semi-tractors/trailers might be the primary focus of a semi driver, the driver must also be proficient enough to be aware of the people working in close proximity. When a driver loses visual contact with workers on foot, they should stop the vehicle

and not proceed until visual contact is re-established. During backing operations, a spotter should be used to assist the driver when there are other workers in the area. In the past, the decedent had sometimes asked another individual to act as a spotter.

MIFACE recommends that both vehicle drivers and spotters receive training to ensure a safe backing activity. Training for equipment/driver operators should include, but not be limited to:

- Window rolled down.
- Radio off.
- No cell phone or similar distraction while backing.
- Foot on brake.
- If you lose sight of the spotter in your mirror, STOP.

Training for the "spotter" should include, but not be limited to:

- Always wear a high visibility reflective vest.
 - Inspect the backing area and all other sides of the vehicle checking for hazards before allowing the vehicle to move - be sure to also check overhead clearance.
 - Communicate any observed hazards to the driver.
 - Stand alone, do not allow anyone to congregate around you.
 - Spotter position: eight to ten feet away from and on the driver side of the vehicle. Stay out of the direct path of the moving/backing vehicle's movement.
 - Keep clear of both the vehicle and any fixed objects. Make sure pathway is clear of tripping hazards. Watch for pinch points behind you such as other vehicles, utility poles, trees, etc.
 - If you cannot see the driver's face in the driver's side rear view mirror, have him/her STOP until you do.
 - Give clear, understandable, and consistent hand signals. Coordinate with driver/operator of what signals are used
 - Walk along the side of the backing vehicle and do not walk backwards while directing the vehicle.
 - Always have an escape route.
 - Never turn your back on the moving equipment.
 - Stop the driver if any hazards are observed or if you are uncertain of the direction that the driver is maneuvering.
- Farmers should conduct a hazard assessment to identify safety hazards/issues and develop a remediation strategy. In this incident, safety issues, including the rock pile location, design of the pig chute, design of driveways, and working alone in the vehicle's blind spot were contributing factors and may have been identified in a hazard assessment.

Hazard assessments are important tools to identify safety hazards and once hazards are identified, remediation efforts can be identified and prioritized. The farm family members had not conducted a "formal" hazard assessment for the farm, but noted that the location of the rock pile had been an issue for backing vehicles for 30 years. Although the issues posed by the rock

pile location were recognized, the family “never got around to” removing the rocks and eliminating the hazard. MIFACE recommends that when a safety hazards are identified, an action plan to fix the hazard be established and the task completed.

The family members indicated that the driveways had been widened to accommodate the backing process, but the MIFACE researcher and the family did not discuss if there had been a consideration to re-design the pig chute to minimize the backing angle of the semi tractor/trailer or altering the access driveways to permit a straight backing to the existing pig chute. Each of these options may have facilitated a safer and easier loading/unloading process.

The family members commented that the decedent, in the past, had occasionally used another individual to act as a spotter to help direct the backing semi-tractor/trailer. Mirrors cannot reflect blind spots directly behind large pieces of agricultural equipment and behind semi-trailers. MIFACE recommends that when an individual cannot be in full view of the driver of the backing vehicle, and especially if an individual must work in the driver’s blind area, that a second individual (spotter) should be present to assist with the backing operation.

The presence of a spotter may have assisted the semi driver in an additional capacity. The driver was backing to the east, which meant his mirrors would have been facing toward the east. The rising sun may have been in his side mirrors, which may have compromised his view of the building and the decedent. A spotter would have been able to direct him so that he would not have to fully rely on the semi’s mirrors to guide his backing task.

If the decedent could not have another person assist him, a communication device, such as a walkie-talkie could have facilitated his communication with the vehicle driver allowing him to easily move out of harm’s way while the vehicle was backing and stopping the vehicle to check trailer/chute alignment.

Other options to assist the backing vehicle driver to align the trailer with the chute could be a trailer wheel alignment “device” such as railroad ties or flags that he could see from his right side mirror.

- As part of the hazard assessment, farmers should determine areas on the farm where agricultural equipment/other vehicles, such as semi-tractor/trailers that transport product to/from the farm, will be backed up and develop a backing vehicle protocol, including training for the family members, for these areas.

Farm family members and workers walk around the farmstead, thus, they are at risk of being struck by/run over by backing farm equipment. Backing equipment blind spots pose a risk for the individual on foot, as they may think that the operator sees them when in fact, the vehicle operator cannot see them. MIFACE recommends that farmers conduct a hazard assessment to

determine the areas on the farm where backing vehicles may be present and develop a backing vehicle protocol to address this hazard.

The farmer should instruct his/her family members and employees about the backing protocols. These protocols should include both agricultural equipment and vehicles, such as semi-tractors/trailers not driven by farm family members/employees. Protocols could include having a spotter to assist the operator of the backing vehicle, backing will not begin without an understandable signal from the spotter that it is safe to start backing, operators of the vehicle must come to a complete stop if visual contact with the spotter is lost and they must not resume backing until visual contact is reestablished, and notification of the family members/workers of the arrival of a semi transporting farm product(s) in farmstead locations where workers on foot are frequently present. An Internet search using the search terms “vehicle backing procedure” found many sample procedures already developed and which could easily be adapted for use by the farm. Examples include but are not limited to:

- ❖ Chevron (Contractor’s Policy)
<http://upstream.chevron.com/contractorsjvbu/documents/VehiclePositioningBackingPolicy.pdf>
- ❖ Municipal Association of South Carolina
<http://www.masc.sc/programs/solutions/insurance/riskletter/2010-Fall/Pages/Deadliestjobintown.aspx>
- ❖ University of Oregon Facility Services, Vehicle Backing/Spotter Policy
https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/6757/fac_spotting.pdf?sequence=1
- ❖ Construction Safety Association of Manitoba
http://www.constructionsafety.ca/toolbox/documents/BackingVehiclespart1_000.pdf
- Trucking employers should determine the feasibility and effectiveness of mounting an after-market backup camera system on the semi trailer to assist the driver to safely back the unit.

Commercial duty backup cameras have been designed for semi tractor/trailer units and have also been used on construction and mining heavy equipment to increase visibility, reduce liability and minimize blind spots to the side and rear of the vehicle/equipment. There are single camera backup systems or multiple camera systems which provide more coverage and minimize blind spots to the side and rear of the trailer. Additionally, there are both wired and wireless backup camera systems. Quick disconnects are available if using a wired system so the system can be quickly and easily be disconnected from the rig when separating from the trailer. There are a number of manufactures/distributors of back up camera systems. Examples include but are not limited to:

- ❖ Mobile Awareness (http://www.mobileawareness.com/products.php?product_cat_id=4)
- ❖ Work Truck Outfitters (<http://www.worktruck-outfitters.com/backup-cameras-trucks-c-576.html>)
- ❖ Diesel Boss (http://www.dieselboss.com/camera/camera_rear_view_truck.htm)
- ❖ Stop Backup Accidents. <http://stopbackupaccidents.com/index.php>

RESOURCES

MIOSHA standards may be found at and downloaded from the MIOSHA, Michigan Department of Licensing and Regulatory Affairs (LARA) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Energy, Labor & Economic Growth, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1845.

- ❖ *An Equipment Operator Died After Being Run Over By A Double Trailer Truck.* California FACE Program. <http://www.cdc.gov/niosh/face/stateface/ca/03ca009.html>
- ❖ *Laborer Dies After Being Backed Over by Dump Truck at a Nighttime Highway Work Zone Construction Site – Massachusetts.* Massachusetts FACE Program. <http://www.cdc.gov/niosh/face/stateface/ma/08MA028.html>
- ❖ *A Laborer Dies in a Street Work Zone after Being Backed Over by a Dump Truck.* California FACE Program. <http://www.cdc.gov/niosh/face/stateface/ca/07ca001.html>
- ❖ *Ground Man for Milling Operation Dies When Struck by a Dump Truck Backing Into Work Zone.* Michigan FACE Program. <http://www.cdc.gov/niosh/face/stateface/mi/06MI096.html>
- ❖ Google Maps. <http://maps.google.com/>

Key Words: Backing semi-trailer, spotter, farmer, blind spot, struck by, backup camera system, agriculture

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5/29/2012